

The Magazine of  
The National Association  
of Home Builders

# Builder

THE

ISSUE

THIS IS WHY  
*the*  
**STANDOUTS  
STAND  
OUT**

# Better, Faster, Cheaper

The pressure is on to construct well-built homes in less time and with less money. These unconventional construction methods can help.

**ALTHOUGH THE GREAT RECESSION IS OVER**, it's more difficult than ever for U.S. home builders to turn a profit. Home prices are not rising fast enough to cover the cost of constructing a house, which has steadily increased from 53% of sales price in 1995 to 62% in 2013. The cost of construction per square foot is up, too—from \$80 per square foot in 2011 to \$95 in 2013, according to the NAHB.

Besides rising costs, builders face a host of other issues that impact their bottom lines and the way they build houses. Those armies of laborers who used to populate jobsites are largely gone, leaving a worker shortage in their wake. Building codes are getting tougher, and nascent energy codes promise to make them more so. And in many markets, affordable land in desirable locations seems to be a thing of the past.

With this in mind, here's a look at building methods that are gaining traction because they save time, money, and headaches—or all of the above—while producing better results and more energy savings.



By **DREW VASS**

Illustrations by **TODD DETWILER**

## PREFABRICATED WALL SYSTEMS

➔ Builders' burgeoning construction costs are fueled in part by the framing industry, which has been adversely affected by the soaring price of lumber and a shortage of skilled crews. In a recent survey, framers were noted by NAHB builders as the least available type of labor needed to construct a home. The association found that the share of construction costs for framing and trusses jumped from 13.5% in 2011 to 17% in 2013.

"When the market took a downturn, framers went out and found other jobs and vocations," says Nancy Mansfield, co-owner of Pacific Wall Systems, a prefab wall provider in Central Point, Ore. "So the labor market for framing dried up."

This has led some builders to consider pre-built wall systems. Unlike on-site stick framing,

which requires experienced workers, it doesn't take much skill to place a labeled wall in its spot. Much like a truss is used for roofs, wall panels are delivered to the site and craned into place.

Builder Troy Williams of Archer Building Co. in El Dorado Hills, Calif., likens the process to "painting by number," adding, "I get a delivery and can begin standing walls immediately."

And those walls, Williams says, are built to absolute perfection, leaving behind no jobsite waste.

The concept of pre-building and shipping walls for residential construction is not new: Sears Roebuck and Co. sold more than 70,000 panelized homes prior to 1940. But according to Ed Hudson, director of market research for Home Innovation Research Labs, the concept has bobbed between adoption rates

of only 5% and 10% for the past 20 years. However, U.S. Census Bureau data indicates that prefab walls may be catching on in certain regions. In the Mid-Atlantic, the number of panelized/precut homes tripled in 2014; in the East North Central division, that number rose by 70%.

The science behind prefab walls supports their ability to save time and labor: An NAHB Building Systems Council study of two identical 2,600-square-foot homes found that using prefab walls saved 66 ½ hours of labor versus on-site construction. But builders and construction experts warn that cost savings shouldn't be expected with prefab walls.

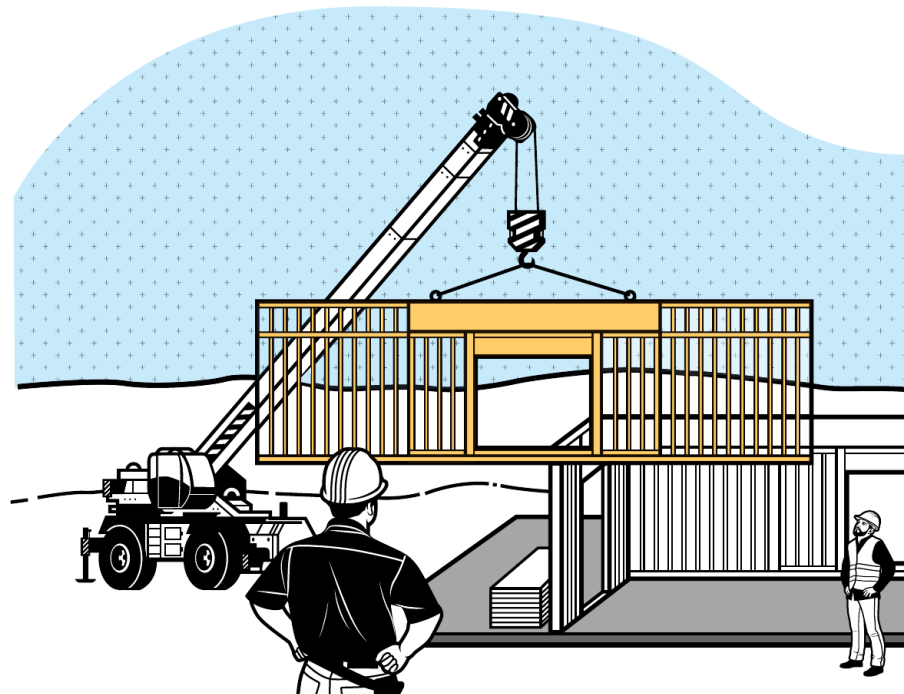
"We don't tell a contractor that he's going to save money using panels," Mansfield says. "He's going to save time," which, she adds, may lead to financial savings.

### Steel Deck Frames

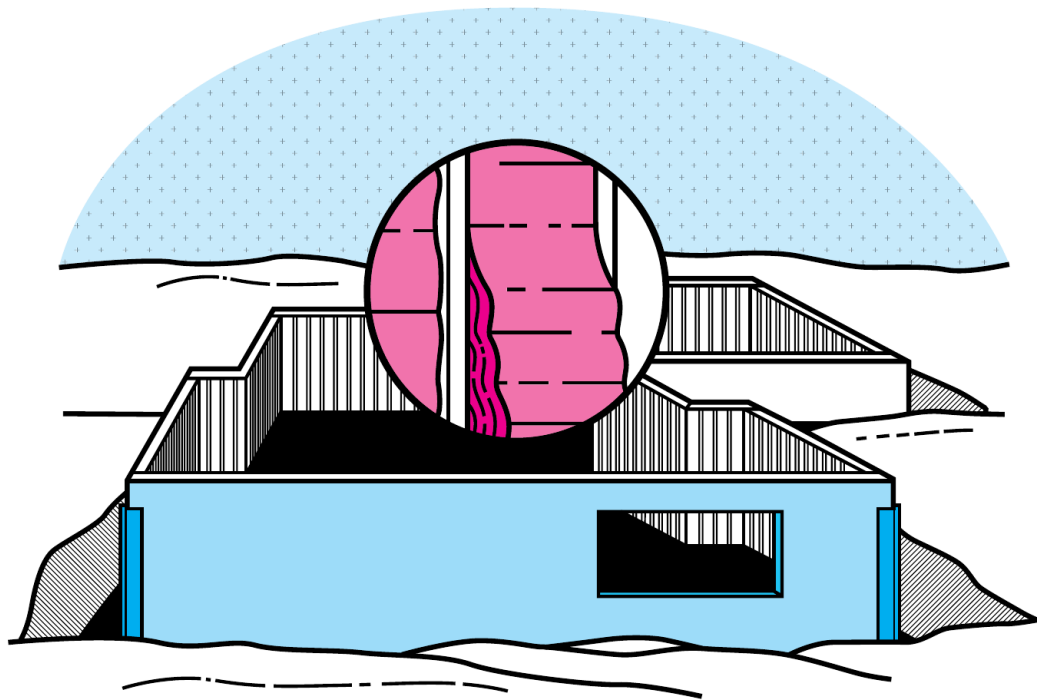
• When it comes to decking, many pros are finding that steel frames offer benefits when compared with pressure treated lumber. Unlike wood frames, which sometimes warp, bow, or twist, steel and aluminum frames provide a perfect, dimensionally stable surface. And like prefab walls, steel and aluminum deck frames are developed to spec and may be shipped precut and ready to assemble.

**Products to Try**  
Trex Elevations  
[trex.com](http://trex.com)

**Versadeck**  
[versadeck.com](http://versadeck.com)



PREFAB WALL PANELS ARE SHIPPED TO THE SITE AND CRANED INTO PLACE.



THE EPITOME BASEMENT FOUNDATION SYSTEM ENCOMPASSES AIR AND MOISTURE BARRIERS AND INSULATION.

## METHOD 2

PROS:  

# COMPOSITE FOUNDATION PANELS

➔ Most methods for basement construction include laying block or setting forms and pouring concrete. But some builders are turning to composite panels to speed up construction. A unique foundation wall system by Composite Panel Systems of Eagle River, Wis., allows builders to construct basements in a matter of hours, complete with air and moisture barriers, top plates, and insulation.

Invented by Glenn Schiffmann and introduced in June 2014, the Epitome system includes 9-foot-tall wall panels that are constructed from foam-cored fiberglass composite and come in lengths of up to 24 feet. Panels are light enough to be set using a light-duty crane or a material handler, and are joined by connection flanges, as well as double overlapping top plates. An inherent foam core provides an R-16.5 thermal insulation rating and panels include a built-in fire retardant, so builders won't have to cover them with drywall to achieve final inspection (although it can be added directly over panels using standard screws designed for metal studs). Once seams are sealed between wall panels using a standard mesh and any liquid-applied sealant that's rated for below-grade installation, backfilling may be performed immediately, following the installation of a concrete floor and first-floor floor joists.

Jim Russell of Russell Builders in Three Lakes, Wis., used Epitome when he faced a time crunch that prohibited poured concrete. "Within hours we had the foundation set," he says. "When you're done, the top plates are dead level."

In October 2014, the product won the Composites and Advanced Materials Exposition Unsurpassed Innovation Award, followed by nationwide code approval; company officials say approval for seismic areas is forthcoming. In terms of cost, Schiffmann admits builders will pay more for his company's walls than they would for poured concrete. Homeowners interviewed for this article report they paid a 10% to 15% premium for Epitome, with one citing a total added cost of \$9,000.

Those homeowners also say the perks are well worth it—most notably how dry and warm their basements feel, along with the extra square footage they obtained via Epitome's 7-inch thickness. The system also offsets the costs for additional wall framing, as well as insulation, water and vapor barriers, and top (sill) plates.




Currently offered nationwide on a limited basis, Epitome's availability is expected to ramp up as distribution is established through a network of component manufacturers.

## Building Blocks

- An Israeli company is developing a technology that may be considered a precursor to 3D-printed houses. **Kite Bricks** are constructed from high-strength concrete and look like cinderblock-size Legos. Through a mortar-free method of attachment, blocks are stacked and affixed together to build walls, ceilings, and floors. Open spaces within each brick interlock, forming channels for routing of mechanicals.

The technology isn't yet available, but company officials say they're planning to begin constructing houses later this year, eventually making them available worldwide.

Visit [kitebricks.com](http://kitebricks.com)




-  helps build better
-  saves time
-  saves money on construction costs or energy bills

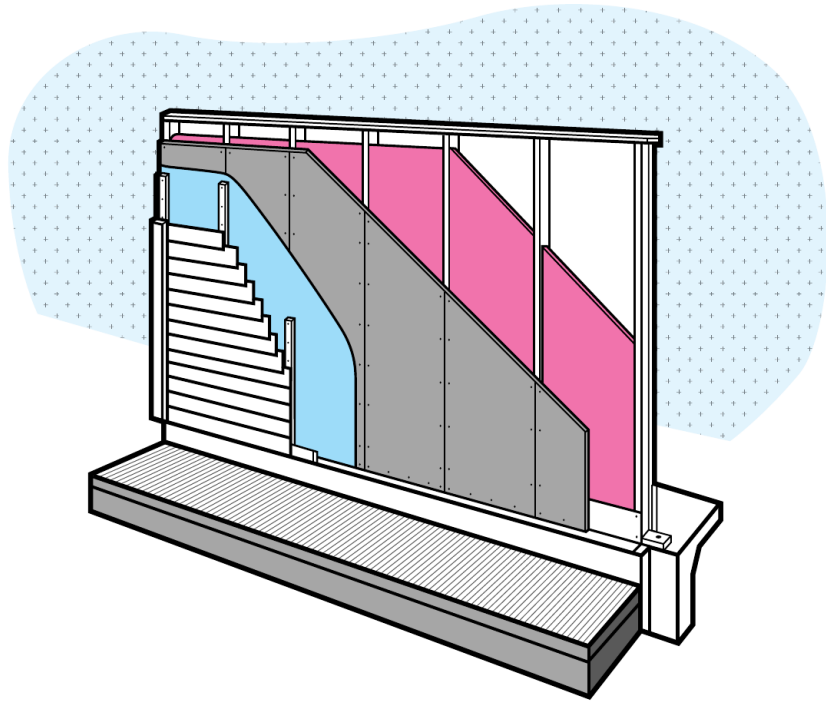
## No Crane Needed

• A new interlocking panel system made of EPS foam and steel studs is light enough to be carried and placed by hand—no crane or special equipment is necessary.

**GigaHouse panels**, which can be used for walls and roofs, eliminate thermal bridging by completely encapsulating studs while providing thermal values ranging from R-24 to R-60. They come in packages derived from builders' plans and are shipped directly to the jobsite.

Visit [gigacrete.com](http://gigacrete.com)

-  helps build better
-  saves time
-  saves money on construction costs or energy bills




PRODUCTS SUCH AS BASF'S HP+ WALL SYSTEM PROVIDE TIME-SAVING SOLUTIONS TO MORE THAN ONE CONSTRUCTION ISSUE.

### METHOD 3

PROS:   

## MULTIPURPOSE PRODUCTS

 There's nothing like a product that does double or triple duty to speed up installation time and lessen costs. Smart builders have migrated to specially designed exterior sheathing products to sidestep the need for additional materials.

Huber's ZIP System panels are a structural sheathing product that includes a built-in vapor permeable, water-resistive barrier that, when combined with seam tape, eliminates the need for any sheet- or liquid-applied barriers.

In addition, SmartSide panels from LP can serve not only as siding, but also as structural sheathing. Because the panels can be applied to walls in the down position, some builders in the Kansas City, Mo., area have been building out exterior walls—complete with siding, trim, soffit, overhangs, fascia and even entire porches—before tilt up.

"This is quite unique, and we're in the process of trying to teach this practice to builders in other parts of the country," says Jason Rowell, LP's director of marketing. "This speeds up construction immensely and also eliminates a lot of the outside work that typically must be done from ladders."

Huber's sheathing typically costs around \$4 to \$5 more than standard OSB, and LP SmartSide, which sells for roughly \$30 per 4-foot-by-8-foot

panel, may forgo the need for sheathing.

In addition to dual-purpose sheathing, a new multipurpose wall system from BASF reduces the amount of lumber needed to build a home while beefing up insulation, air sealing, and moisture control. The HP+ Wall System combines three of the company's insulation products to deliver control of heat, air, and moisture and increased structural integrity. The design capacity of a wall built with the system is up to 135% greater than that of a wall built with standard construction methods, according to BASF.

Emily Van Court, technical project adviser and architectural consultant for BASF's Center for Building Excellence, says the system allows builders to use standard 2x4 construction spaced 24 inches on-center, as well as single top plates and reduced framing around windows, which helps offset the cost for upgrading to spray foam insulation. The complete system addresses thermal bridging issues, while providing R-34 levels of insulation.

Wisconsin green builder Tim O'Brien says the HP+ Wall System has helped his firm lower construction costs while providing a superior building envelope. "Overall, this experience has shown us how we can achieve higher performance at a price point that delivers outstanding value to our customers," he says.

## SEALED CRAWLSPACES

While foundation vents are supposed to prevent crawlspaces from developing moisture issues, over the course of a couple of centuries of home building, it's become apparent that this theory doesn't always hold up. But smart builders have found a way to avoid the callbacks, discomfort, and energy loss that come with damp, humid crawlspaces; these days, of the 15% to 20% of U.S. homes that are constructed with crawlspaces, one-third are now unvented.

A report published in 2013 by the Department of Energy's Building America Solution Center comparing 12 new homes—four with vented crawlspaces and eight with sealed and conditioned crawlspaces—

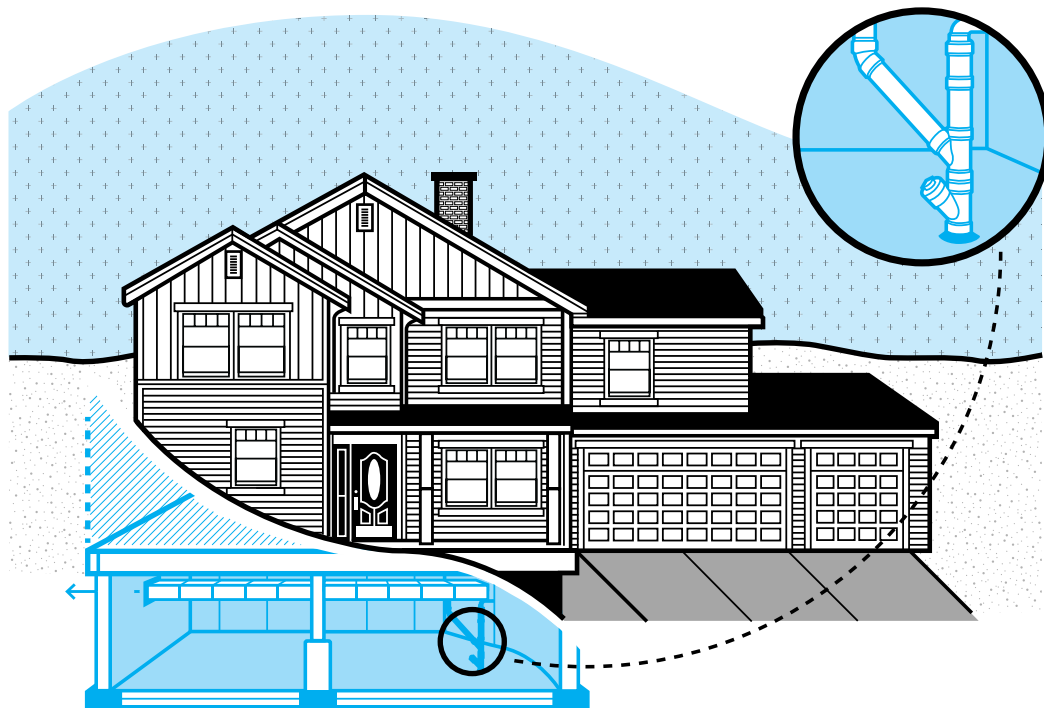
showed a 15% to 18% reduction in heating- and cooling-related energy consumption with the sealed models. Some of those offsets are associated with routing ductwork through a conditioned air space. Other benefits include a 20% reduction in crawlspace humidity.

Sealed crawlspaces achieve these benefits by completely sealing the ground floor with a minimum 6-mil air and moisture barrier, along with sealing and insulating the foundation and perimeter framing and an air-tight access panel. Experts also suggest adding a conditioned air supply with back-feed dampers (but no returns). Other requirements include a 4-inch threshold at access doors and a gap along the top portion of

perimeter foundation walls to facilitate inspections for insects.

"From my perspective, as a builder, there's a degree of liability protection [in sealed crawlspaces]," explains Todd Usher, president of Greer, S.C.-based Addison Homes. "In certain areas, it isn't a question of when vented crawlspaces will get mold and mildew, but how soon."

In the years before founding his building company, Usher worked as a home inspector, where he says he found moisture issues in 99.9% of crawlspaces. As a result, for approximately the past six years, he has made sealed crawlspaces a standard feature on his homes, which he says adds roughly \$2.50 per square foot of crawlspace.



BECAUSE THEY'RE UNVENTED, SEALED CRAWLSPACES REQUIRE A TERMINAL THAT BRINGS IN CONDITIONED AIR.

## 3D Models Take Off

- Forward-thinking builders like Shea Homes are putting 3D printing technology to use in many ways. In addition to creating 3D models on a small scale, builders use 3D printers to produce moldings and trim that otherwise may cost hundreds of dollars to have hand carved or machined. Chinese firm WinSun uses a cement-based filament to "print" houses up to 20 feet tall in less than 24 hours.

**User-Friendly Printers to Try**

**The MakerBot Replicator**

[www.makerbot.com](http://www.makerbot.com)

**Dremel Idea Builder**

[3dprinter.dremel.com](http://3dprinter.dremel.com)

- 👍 helps build better
- 🕒 saves time
- 💰 saves money on construction costs or energy bills

METHOD 5

PROS: 👍🕒

# LIQUID-APPLIED VAPOR BARRIERS



LIQUID VAPOR BARRIERS ARE SPRAYED ONTO THE EXTERIOR OF A HOME TO MAKE IT AIR AND WATER TIGHT.

## A Concrete Solution

• Until recently, ground slab construction has not been possible in areas with shifting soils, but a new system allows builders to use concrete slabs where they previously were confined to more expensive pier-and-beam foundations.

**The Tella Firma system**, which has been used with success by Lennar Corp., lifts a standard 5-inch concrete slab as high as 13 inches to create a protective void that isolates the slab and protects it from damaging soil swells, contractions, and movement.

Visit [tellafirma.com](http://tellafirma.com)

→ Year after year, more builders are putting down their slap staplers and picking up rollers and sprayers in favor of liquid-applied air and moisture barriers, according to the Annual Builders Practice Survey from Home Innovation Research Labs. The most basic benefit is obvious: a singular monolithic coating that directly bonds to exterior wall sheathing without fasteners makes quick work of sealing a home from the elements. And while building science experts say the same results can be achieved with properly installed sheet-based barriers, home builders who've made the switch say they've discovered differences.

"Once you factor in all of the additional things you need to do for [sheet-based wraps], not to

mention all of the holes you're constantly putting in them, which you have to go back and fix, I'd say that the time and labor is about the same," says David Schleicher, president of Prairie Design-Build in Lake Quivira, Kan. "But, in the end, the durability and confidence that we have in liquid-applied [barriers] is far greater."

Carey Alcott, president of Mount Pleasant, S.C.-based William Carey Homes, says he finds liquid-applied barriers easier to visually inspect and, therefore, easier to trust. "I appreciate the fact that you can see that the building envelope is air and watertight," he says. "You can't do that with a standard house wrap."

Alcott also says that, through blower-door tests, his company

has discovered that liquid-applied barriers do a better job of sealing up the building envelope.

"I used to exclusively use spray foam insulation, not only for its R-value, but also to form an air-tight barrier," Alcott says. "Air may have gotten into the walls through a housewrap, but it wasn't going to penetrate the [closed-cell] foam to the inside environment. After the second house I did with [a liquid-applied product], I realized that all I need is thermal insulation," which he says now often includes less expensive fiberglass batts.

That's not to say liquid-applied products don't come with any downsides. They do. Most notably, they're more expensive. Liquids clock in anywhere from \$1.88 to \$3.38 more per square foot than sheet-based barriers. And though most liquid-applied products apply with a standard, heavy duty paint roller or a regular unpressurized sprayer, unlike sheet-based barriers, they also carry minimum temperature requirements. Manufacturers suggest a temperature of 40 F and above. (Rapid cure products that withstand colder temperatures are available, but cost extra.)

Liquid-applied barriers also require pre-treatment of the seams between sheathing with a seam sealer and, in some cases, a cloth mesh or tape. In cases where manufacturers offer a barrier as a complete system (including things like seam sealer, tapes and flashings), Peter Yost, vice president of technical services for building science publisher BuildingGreen, recommends going with the full package based on his company's evaluations. He says builders can expect better and more guaranteed results.